

CLAIMS

We claim:

1. A method of forming an Si-Ge epitaxial layer, comprising the steps of:
 - providing a structure;
 - forming a doped Si-Ge seed layer over the structure; the doped Si-Ge seed layer having increased nucleation sites; and
 - 5 forming the Si-Ge epitaxial layer upon the doped Si-Ge seed layer; whereby the Si-Ge epitaxial layer lacks discontinuity.
2. The method of claim 1, wherein the structure is an intermediate substrate.
3. The method of claim 1, wherein the structure includes silicon oxide and/or polysilicon.
4. The method of claim 1, wherein the structure is a silicon substrate.
5. The method of claim 1, wherein the doped Si-Ge seed layer has a thickness of from about 10 to 400Å.
6. The method of claim 1, wherein the doped Si-Ge seed layer has a thickness of from about 20 to 200Å.

7. The method of claim 1, wherein the doped Si-Ge seed layer is doped with boron, C, P or As.
8. The method of claim 1, wherein the doped Si-Ge seed layer is doped with a dopant to a concentration of from about $1\text{E}18$ to $1\text{E}20$ atoms/cm².
9. The method of claim 1, wherein the doped Si-Ge seed layer is doped with a dopant to a concentration of about $1\text{E}19$ atoms/cm².
10. The method of claim 1, wherein the doped Si-Ge seed layer is doped with boron to a concentration of from about $1\text{E}18$ to $1\text{E}20$ atoms/cm².
11. The method of claim 1, wherein the doped Si-Ge seed layer is doped with boron to a concentration of about $1\text{E}19$ to $1\text{E}20$ atoms/cm².
12. The method of claim 1, wherein the Si-Ge epitaxial layer has a thickness of from about 100 to 700Å.
13. The method of claim 1, wherein the doped Si-Ge seed layer is doped with boron using B₂H₆.
14. The method of claim 1, wherein the doped Si-Ge seed layer is doped with boron using B₂H₆ under the following conditions:

B₂H₆: from about 0 to 100 sccm;

temperature: from about 500 to 750°C;
pressure: from about 20 to 200 Torr; and
time: from about 10 to 120 seconds.

15. The method of claim 1, wherein the doped Si-Ge seed layer is doped with boron using B_2H_6 under the following conditions:

B_2H_6 : from about 0 to 50 sccm;
temperature: from about 600 to 700°C;
pressure: from about 50 to 150 Torr; and
time: from about 10 to 60 seconds.

16. The method of claim 1, wherein the Si-Ge epitaxial layer is formed under the following conditions:

Si precursor: SiH_4 , SiH_2Cl_2 , $SiHCl_3$ or $SiCl_4$;
Ge precursor: GeH_4 or $GeCl_4$;
temperature: from about 500 to 750°C;
pressure: from about 20 to 200 Torr; and
time: from about 20 to 400 seconds.

17. The method of claim 1, wherein the Si-Ge epitaxial layer is formed under the following conditions:

Si precursor: SiH_4 ;
Ge precursor: GeH_4 ;
temperature: from about 600 to 700°C;

pressure: from about 50 to 150 Torr; and

time: from about 100 to 300 seconds.

18. The method of claim 1, including the step of forming a cap layer over the Si-Ge epitaxial layer.

19. The method of claim 1, including the step of forming a cap layer over the Si-Ge epitaxial layer; the cap layer having a thickness of from about 20 to 200Å.

20. The method of claim 19, the cap layer being formed of silicon.

21. A Si-Ge epitaxial layer structure, comprising:

an intermediate substrate;

a doped Si-Ge seed layer over the intermediate substrate; the doped Si-Ge seed layer having increased nucleation sites; and

5 a Si-Ge epitaxial layer upon the doped Si-Ge seed layer to form the Si-Ge epitaxial layer structure; whereby the Si-Ge epitaxial layer lacks discontinuity.

22. The structure of claim 21, wherein the intermediate substrate includes silicon oxide and/or polysilicon.

23. The structure of claim 21, wherein the intermediate substrate is a silicon substrate.

24. The structure of claim 21, wherein the doped Si-Ge seed layer has a thickness of from about 10 to 400Å.
25. The structure of claim 21, wherein the doped Si-Ge seed layer is doped with boron, C, P or As.
26. The structure of claim 21, wherein the doped Si-Ge seed layer is doped with a dopant to a concentration of from about 1E18 to 1E20 atoms/cm².
27. The structure of claim 21, wherein the doped Si-Ge seed layer is doped with boron to a concentration of from about 1E18 to 1E20 atoms/cm².
28. The structure of claim 21, wherein the Si-Ge epitaxial layer has a thickness of from about 100 to 700Å.
29. The structure of claim 21, wherein the doped Si-Ge seed layer is doped with boron using B₂H₆.
30. The structure of claim 21, including a cap layer over the Si-Ge epitaxial layer.
31. The structure of claim 21, including a cap layer over the Si-Ge epitaxial layer; the cap layer having a thickness of from about 20 to 200Å.